

State/Industry Network

Air Quality Report

1st Quarter 2000

Prepared By:

Air Quality Monitoring Branch
Division of Air Quality
North Dakota Department of Health

August 2000

TABLE OF CONTENTS

<u>Description</u>	<u>Page</u>
DISCUSSION OF MONITORING RESULTS	1
Sulfur Dioxide (SO ₂)	2
Sulfur Dioxide (SO ₂) 5-Minute Average	2
Ozone (O ₃)	2
Nitrogen Dioxide (NO ₂)	2
Inhalable FRM PM _{2.5} Particulates	2
Inhalable PM ₁₀ Particulates	3
Inhalable PM ₁₀ Sulfates	3
PM ₁₀ Sulfate/PM ₁₀ Analysis	3
AMBIENT AIR QUALITY DATA SUMMARIES	5
Sulfur Dioxide	6
Sulfur Dioxide 5-Minute Averages	8
Ozone	9
Nitrogen Dioxide	10
Inhalable FRM PM _{2.5} Particulates	11
Inhalable PM ₁₀ Particulates	12
Inhalable PM ₁₀ Sulfates	12
PM ₁₀ Sulfate/PM ₁₀ Total Mass Ratio	13
EXCEEDANCE LISTINGS	15
By Site Date Hour	16
By Date Hour Site	16

SECTION ONE

DISCUSSION OF MONITORING RESULTS

Sulfur Dioxide (SO₂)

There were no exceedances of the state or federal standards during the quarter. The maximum 1-hour concentration was 190 ppb on March 5 at DGC #17; the maximum 3-hour concentration was 86 ppb on March 5 at DGC #17; and, the maximum 24-hour concentration was 34 ppb on February 3 at Mandan - SPM. All sites achieved at least an 80% data recovery for the period

Sulfur Dioxide (SO₂) 5-Minute Average

The maximum 5-minute concentration was 482 ppb on January 24 at Bear Paw - MGP #3.

Ozone (O₃)

There was no exceedance of the ozone standard during the quarter. The maximum observed 1-hour concentration was 57 ppb on March 5 at TRNP - SU (Painted Canyon). The 4th highest 8-hour concentration was 48 ppb on February 19 at Dunn Center. All sites achieved at least an 80% data recovery for the period operated..

Nitrogen Dioxide (NO₂)

The maximum 1-hour concentration observed was 45 ppb on February 12 at Beulah - North. All sites achieved at least an 80% data recovery for the period operated.

Inhalable FRM PM_{2.5} Particulates

The maximum 24-hour average concentration was 28.1 µg/m³ on February 21 at Fargo NW. All sites achieved at least an 80% data recovery for the period operated.

A sampler was started in Dickinson effective January 1.

Inhalable PM₁₀ Particulates

There was no exceedance of the 24-hour standard during the quarter. The maximum 24-hour average concentration was 48.0 µg/m³ on March 7 at Short Creek - SPM. Both sites achieved at least an 80% data recovery for the period operated.

Inhalable PM₁₀ Sulfates (SO₄)

The purpose for sulfate analysis is to aid the Department in assessing the impact of SO₂ emissions on inhalable particulate concentrations and visibility. The maximum 24-hour PM₁₀ sulfate concentration was 4.0 µg/m³ on February 24 at Fargo NW. Both sites achieved at least an 80% data recovery for the period operated.

PM₁₀ Sulfate/PM₁₀ Analysis

The PM₁₀ sulfate/PM₁₀ total mass tables present statistics for PM₁₀ sulfate and PM₁₀ total mass when both concentrations are greater than the respective minimum detectable concentration: 0.5 µg/m³ for PM₁₀ sulfate analysis; 4 µg/m³ for PM₁₀ total mass. Statistics for the ratio are produced by evaluating the ratio of the PM₁₀ sulfate concentration to the PM₁₀ total mass concentration for each data pair. In the individual summaries, one-half of the minimum detectable concentration is substituted for those concentrations less than the minimum detectable value. However, when the PM₁₀ total mass concentration is less than 4 µg/m³, the PM₁₀ sulfate concentration can be higher than the PM₁₀ total mass concentration. This is because of the variability in the sulfate analysis procedure at low concentrations. Therefore, when calculating the ratio of PM₁₀ sulfate concentration to PM₁₀ total mass concentration, only data pairs where both the PM₁₀ sulfate and PM₁₀ total mass concentrations are greater than the minimum detectable concentrations are used. When the ratio is multiplied by 100, it becomes the percentage of total mass which is sulfate. The maximum 24-hr PM₁₀ Sulfate/PM₁₀ total mass ratio was 0.284 (28.4%) on March 1 at Fargo NW. The maximum average ratio was 0.145 (14.5%) at Fargo NW.

SECTION TWO

AMBIENT AIR QUALITY DATA

SUMMARIES

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Sulfur Dioxide (ppb)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	1 - HOUR		M	A	X	I	M	A	24 - HOUR		ARITH MEAN	1HR #>273	24HR #>99	% >MDV
				1ST MM/DD/HH	2ND MM/DD/HH	1ST MM/DD/HH	3 MM/DD/HH	1ST MM/DD/HH	2ND MM/DD/HH	1ST MM/DD	2ND MM/DD						
Amerada Hess - Tioga #1	2000	JAN-MAR	1793	28 02/01/23	24 01/05/00	19 02/01/23	17 03/21/17	6 01/14	5 02/20	1.7	19.3						
Amerada Hess - Tioga #3	2000	JAN-MAR	2162	63 01/10/12	59 02/03/13	47 02/03/14	30 02/03/20	20 02/03	10 01/15	2.6	27.1						
Bear Paw - MGP #3	2000	JAN-MAR	2169	138 01/24/08	33 02/12/12	49 01/24/08	23 02/12/14	10 01/24	5 02/12	1.5	15.2						
Bear Paw - MGP #5	2000	JAN-MAR	2158	37 02/12/13	32 01/29/11	25 02/12/14	19 02/13/05	6 02/13	5 02/12	1.5	15.1						
Beulah - North	2000	JAN-MAR	2172	40 02/23/14	34 03/05/10	20 03/05/11	19 02/23/14	6 03/05	6 02/12	1.9	27.8						
DGC #12	2000	JAN-MAR	2150	54 03/05/10	35 03/05/09	30 03/05/11	17 03/09/17	7 03/05	7 01/12	2.3	38.3						
DGC #14	2000	JAN-MAR	2150	37 02/23/11	28 02/23/10	24 02/23/11	16 03/16/17	5 02/12	5 02/23	1.9	21.6						
DGC #16	2000	JAN-MAR	2171	32 03/05/08	29 03/16/17	15 01/12/02	14 03/01/14	6 01/12	5 02/13	1.8	20.1						
DGC #17	2000	JAN-MAR	2168	190 03/05/08	56 03/05/07	86 03/05/08	39 02/23/11	17 03/05	10 02/23	1.6	10.6						
Dunn Center	2000	JAN-MAR	2170	21 01/11/18	21 03/05/12	14 01/11/20	12 03/05/14	5 02/12	4 01/11	1.5	23.4						
Fargo NW	2000	JAN-MAR	2173	6 02/18/20	5 02/18/21	3 02/18/17	3 02/18/23	2 02/18	2 01/29	1.1	4.1						
Hannover	2000	JAN-MAR	2171	65 03/09/08	64 03/09/07	46 03/09/08	36 01/31/17	12 01/31	11 03/11	2.2	25.1						
Mandan - SPM	2000	JAN-MAR	2168	132 02/25/19	128 02/06/20	82 02/26/05	79 01/10/14	34 02/03	30 01/03	6.3	43.0						
Mandan NW - SPM	2000	JAN-MAR	2170	90 02/24/22	73 02/24/23	67 02/24/23	50 03/28/20	15 03/28	11 02/24	2.8	23.4						

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : SULFUR DIOXIDE (ppb)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	1 - HOUR		3 - HOUR		24 - HOUR		ARITH MEAN	1HR #>273	24HR #>99	% >MDV
				1ST MM/DD/HH	2ND MM/DD/HH	1ST MM/DD/HH	2ND MM/DD/HH	1ST MM/DD	2ND MM/DD				
Sharon	2000	JAN-MAR	2168	5 02/18/20	5 02/18/21	4 02/18/20	3 02/18/23	2 02/18	2 02/20	1.0			2.2
Short Creek, ND	2000	JAN-MAR	2170	119 02/06/12	46 01/05/06	53 02/06/14	34 01/05/08	11 01/05	9 02/06	2.4			31.1
TRNP - SU (Painted Canyon)	2000	JAN-MAR	1892	11 01/11/18	11 02/23/05	9 02/13/05	9 01/11/20	4 02/15	4 02/13	1.2			9.4
White Shield	2000	JAN-MAR	2167	18 01/13/19	14 02/01/01	10 01/12/14	10 02/01/02	6 02/12	4 01/12	1.5			15.1

The maximum 1-hour concentration is 190 ppb at DGC #17 on 03/05/08
The maximum 3-hour concentration is 86 ppb at DGC #17 on 03/05/08
the maximum 24-hour concentration is 34 ppb at Mandan - SPM on 02/03

* The air quality standards are:

STATE Standards -

- 1) 273 ppb maximum 1-hour average concentration.
- 2) 99 ppb maximum 24-hour average concentration.
- 3) 23 ppb maximum annual arithmetic mean concentration.

FEDERAL Standards -

- 1) 500 ppb maximum 3-hour concentration not to be exceeded more than once per year.
- 2) 140 ppb maximum 24-hour concentration not to be exceeded more than once per year.
- 3) 30 ppb annual arithmetic mean.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Sulfur Dioxide 5-Minute Averages (ppb)

LOCATION	YEAR	PERIOD	OBS	5 - M I N U T E		M A X I M A		# HOURS >600	% >MDV
				1ST MM/DD/HH	DATE MM/DD/HH	2ND MM/DD/HH	DATE MM/DD/HH		
Bear Paw - MGP #3	2000	JAN-MAR	2169	482	01/24/08	154	01/24/09	71	02/12/12
Bear Paw - MGP #5	2000	JAN-MAR	2158	56	01/29/11	55	01/29/10	51	02/12/13
Beulah - North	2000	JAN-MAR	2172	116	03/05/10	88	03/05/11	51	02/23/14
Dunn Center	2000	JAN-MAR	2170	38	01/11/17	36	01/12/06	29	03/16/16
Fargo NW	2000	JAN-MAR	2173	6	02/18/20	5	02/18/21	4	01/16/14
Hannover	2000	JAN-MAR	2171	156	03/09/08	113	01/31/14	112	01/31/15
Mandan - SPM	2000	JAN-MAR	2168	203	02/06/20	197	03/26/14	186	01/03/14
Mandan NW - SPM	2000	JAN-MAR	2170	167	03/22/11	138	02/24/22	121	02/28/05
Sharon	2000	JAN-MAR	2168	5	02/18/20	5	02/18/21	4	02/18/19
Short Creek, ND	2000	JAN-MAR	2170	193	02/06/12	90	01/05/06	77	02/06/13
TRNP - SU (Painted Canyon)	2000	JAN-MAR	1892	11	01/11/18	11	02/23/05	10	01/11/19

The maximum 5-minute concentration is 482 ppb at Bear Paw - MGP #3 on 01/24/08

* No Standard is currently in effect:

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Ozone (PPB)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	M A X I M A				8 - HOUR				4TH MM/DD/HH	1HR #>120	8HR #>80
				1ST MM/DD/HH	-	HOUR 2ND MM/DD/HH	1ST MM/DD/HH	2ND MM/DD/HH	-	HOUR 3RD MM/DD/HH	1HR #>120			
Beulah - North	2000	JAN-MAR	2097	52 02/20/14	-	52 03/22/15	48 02/19/13	46 02/19/12	-	46 02/19/11	46 02/19/10			
Dunn Center	2000	JAN-MAR	2172	52 03/22/22	-	52 03/22/13	48 03/22/09	48 02/20/10	-	48 02/19/12	48 02/19/11			
Fargo NW	2000	JAN-MAR	2171	51 03/05/15	-	50 02/18/15	48 03/25/09	47 03/25/10	-	47 02/19/12	47 02/19/11			
Hannover	2000	JAN-MAR	2172	52 02/21/16	-	51 02/19/16	49 02/20/09	48 02/20/08	-	48 02/20/07	48 02/20/06			
Sharon	2000	JAN-MAR	2170	50 02/20/15	-	49 02/20/14	46 03/25/10	45 03/25/09	-	45 02/20/09	45 03/20/08			
TRNP - SU (Painted Canyon)	2000	JAN-MAR	2173	57 03/05/15	-	55 03/05/16	52 03/05/10	48 03/05/11	-	48 03/05/09	48 03/05/12			

The maximum 1-hour concentration is 57 ppb at TRNP - SU (Painted Canyon) on 03/05/15
The 4th highest 8-hour concentration is 48 ppb at Dunn Center on 02/19/11

* The air quality standards for ozone are:

STATE - 120 ppb not to be exceeded more than once per year.

FEDERAL - Fourth highest daily maximum 8-hour averages for a 3-year period not to exceed 80 ppb.

*** Less than 80% of the possible samples (data) were collected.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Nitrogen Dioxide (ppb)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	M A X I M A		ARITH MEAN	% >MDV
				1ST MM/DD/HH	2ND MM/DD/HH		
Beulah - North	2000	JAN-MAR	2166	45 02/17/17	44 02/17/18	3.4	94.4
DGC #12	2000	JAN-MAR	2161	43 02/17/18	41 02/17/19	4.0	99.9
DGC #17	2000	JAN-MAR	2162	42 03/04/20	37 02/27/20	4.2	100.0
Dunn Center	2000	JAN-MAR	2167	15 01/31/16	13 03/12/08	1.9	90.8
Fargo NW	2000	JAN-MAR	2169	45 03/16/22	41 02/21/18	8.0	96.7
Hannover	2000	JAN-MAR	2164	29 01/31/23	25 01/13/17	2.7	99.1
Sharon	2000	JAN-MAR	2168	12 01/13/17	12 02/18/21	2.0	83.7
Short Creek, ND	2000	JAN-MAR	2165	22 02/12/07	20 01/05/06	3.1	97.6

The maximum 1-hour concentration is 45 ppb at Beulah - North on 02/17/17

* The air quality standards are:
STATE - 53 ppb maximum annual arithmetic mean.

FEDERAL - 53 ppb annual arithmetic mean.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Inhalable FRM PM_{2.5} Particulates ($\mu\text{g}/\text{m}^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	24 - HOUR			ARITH MEAN	#> 65	AM>15	% >MDV
					1ST MM/DD	2ND MM/DD	3RD MM/DD				
Beulah - North	2000	JAN-MAR	14	1.8	10.1 01/13	8.7 01/19	8.6 02/18	6.4			92.9
Bismarck Residential	2000	JAN-MAR	31	3.6	21.3 01/28	13.8 03/07	12.1 02/24	7.6			100.0
Dickinson Residential	2000	JAN-MAR	16	1.3	10.1 02/12	9.6 01/19	9.0 02/24	6.0			87.5
Fargo NW	2000	JAN-MAR	30	3.3	28.1 02/21	26.5 01/28	25.4 02/24	10.2			100.0
Grand Forks - North	2000	JAN-MAR	28	2.8	28.0 01/28	22.4 02/24	20.3 02/15	9.7			100.0
Lignite, ND	2000	JAN-MAR	15	1.5	12.7 02/12	12.2 02/24	10.9 01/13	7.3			93.3
Sharon	2000	JAN-MAR	14	0.4	11.9 02/24	11.8 02/18	10.1 01/13	6.3			85.7
Short Creek, ND	2000	JAN-MAR	15	1.5	11.8 02/06	11.8 02/24	11.8 03/07	7.1			93.3

The maximum 24-hour concentration is 28.1 $\mu\text{g}/\text{m}^3$ at Fargo NW on 02/21

* The ambient air quality standards are:

FEDERAL Standards -

- 1) 24-hour: 3-year average of 98th percentiles not to exceed 65 $\mu\text{g}/\text{m}^3$.
- 2) Annual: 3-year average not to exceed 15 $\mu\text{g}/\text{m}^3$.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Inhalable PM₁₀ Particulates ($\mu\text{g}/\text{m}^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	M A X I M A			ARITH MEAN	#>150	AM>50	% >MDV
					1ST MM/DD	2ND MM/DD	3RD MM/DD				
Fargo NW	2000	JAN-MAR	15	5.5	28.7 03/07	27.1 02/24	16.7 01/19	14.0			100.0
Short Creek, ND	2000	JAN-MAR	16	5.3	48.0 03/07	31.0 02/06	22.3 01/19	15.9			100.0

The maximum 24-hour concentration is 48.0 $\mu\text{g}/\text{m}^3$ at Short Creek - SPM on 03/07

* The STATE and FEDERAL air quality standards are:

- 1) 150 $\mu\text{g}/\text{m}^3$ maximum averaged over a 24-hour period with no more than one expected exceedance per year.
- 2) 50 $\mu\text{g}/\text{m}^3$ expected annual arithmetic mean.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Inhalable PM₁₀ Sulfates ($\mu\text{g}/\text{m}^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	M A X I M A			ARITH MEAN	#>15.	AM>5.	% >MDV
					1ST MM/DD	2ND MM/DD	3RD MM/DD				
Fargo NW	2000	JAN-MAR	15	0.6	4.0 02/24	3.5 02/18	3.5 03/19	1.9			100.0
Short Creek - SPM	2000	JAN-MAR	16	0.2	3.3 03/07	3.1 03/13	2.4 02/12	1.0			86.6

The maximum 24-hour concentration is 4.0 $\mu\text{g}/\text{m}^3$ at Fargo NW on 02/24

* No standard is currently in effect.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : PM₁₀ Sulfate/PM₁₀ Total Mass Ratio (Percentage)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	M	A	X	I	M	A	ARITH MEAN
					1ST MM/DD	2ND MM/DD	3RD MM/DD				
Fargo NW	2000	JAN-MAR	15	3.9	28.4 03/01	26.7 02/18	25.5 01/31				14.5
Short Creek - SPM	2000	JAN-MAR	14	3.5	20.8 03/13	18.8 01/25	18.3 02/24				12.7

The maximum 24-hour ratio is 28.4 percent at Fargo NW on 03/01

* No standard is currently in effect.

SECTION THREE

EXCEEDANCE LISTINGS

By Site Date Hour

All Units Are in Parts Per Billion Except Wind Direction (Degrees),
Wind Speed (MPH), CO (PPM), and PM_{2.5} and PM₁₀ ($\mu\text{g}/\text{m}^3$)

The * Identifies the Exceedances

NONE

By Date Hour Site

All Units Are in Parts Per Billion Except Wind Direction (Degrees),
Wind Speed (MPH), CO (PPM), and PM_{2.5} and PM₁₀ ($\mu\text{g}/\text{m}^3$)

The * Identifies the Exceedances

NONE

